 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																		
COURSE NAME : MECHANICAL/CIVIL/CHEMICAL/COMPUTER/ELECTRONICS/ELECTRICAL ENGINEERING GROUPS																		
COURSE CODE : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/ EV/EX/IC/IE/IS/ME/MU/PG/PT/ PS /CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX																		
DURATION OF COURSE: 6 SEMESTERS for AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ME/MU/PG/PT/PS/DC/TC/TX (8 SEMESTERS for CD / CV / ED / EI / FE / IU / MH / MI) WITH EFFECT FROM 2012 - 13																		
SEMESTER : FIRST DURATION : 16 WEEKS																		
PATTERN : FULL TIME - SEMESTER SCHEME : G																		
SR. NO	SUBJECT TITLE		Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17100)	
					TH	TU	PR	PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)			
									Max	Min	Max	Min	Max	Min	Max	Min		
1	English		ENG	17101	03	--	02	03	100	40	--	--	--	--	25@	10	50	
2★	Basic Science	Physics	EPH	17102	02	--	02	02	50	100	40	25@	50	20	--	--		--
		Chemistry	ECH	17103	02	--	02	02	50	--	--	25@	--	--	--	--		--
3	Basic Mathematics		BMS	17104	04	01	--	03	100	40	--	--	--	--	--	--		--
4	Engineering Graphics		EGG	17001	02	--	04	--	--	--	50#	20	--	--	50@	20		--
5	Computer Fundamentals		CMF	17002	01	--	04	--	--	--	50#*	20	--	--	25@	10		--
6	Basic Workshop Practice (Civil Group)		WPC	17003	--	--	04	--	--	--	--	--	--	--	50@	20		--
	Basic Workshop Practice (Electrical Group)		WPE	17004	--	--	04	--	--	--	--	--	--	--	50@	20		--
	Basic Workshop Practice (Electronics Group)		WPX	17005	--	--	04	--	--	--	--	--	--	--	50@	20		--
	Basic Workshop Practice (Mechanical & Chemical Group)		WPM	17006	--	--	04	--	--	--	--	--	--	--	50@	20		--
	Basic Workshop Practice (Computer Group)		WPI	17007	--	--	04	--	--	--	--	--	--	--	50@	20	--	
TOTAL					14	01	18	--	300	--	150	--	--	--	150	--	50	

Student Contact Hours Per Week: **33 Hrs.**
Theory and practical periods of 60 minutes each. Total Marks : **650**
 @ Internal Assessment, # External Assessment, #* On Line Examination, No Theory Examination.
 Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, ,OR-Oral, TW- Term work, SW- Sessional Work

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code as mentioned.

★ Basic Science is divided into two parts- Basic Physics and Basic Chemistry. Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Basic Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.

★ **Candidate remaining absent in examination of any one part of Basic Science subject i.e. Physics, Chemistry will be declare as Absent in Mark List and has to appear for examination. The marks of the part for which candidate was present will not be processed or carried forward.**

Course Name : All Branches of Diploma in Engineering and Technology.

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX**

Semester : First

Subject Title : English

Subject Code : 17101

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

Rationale:

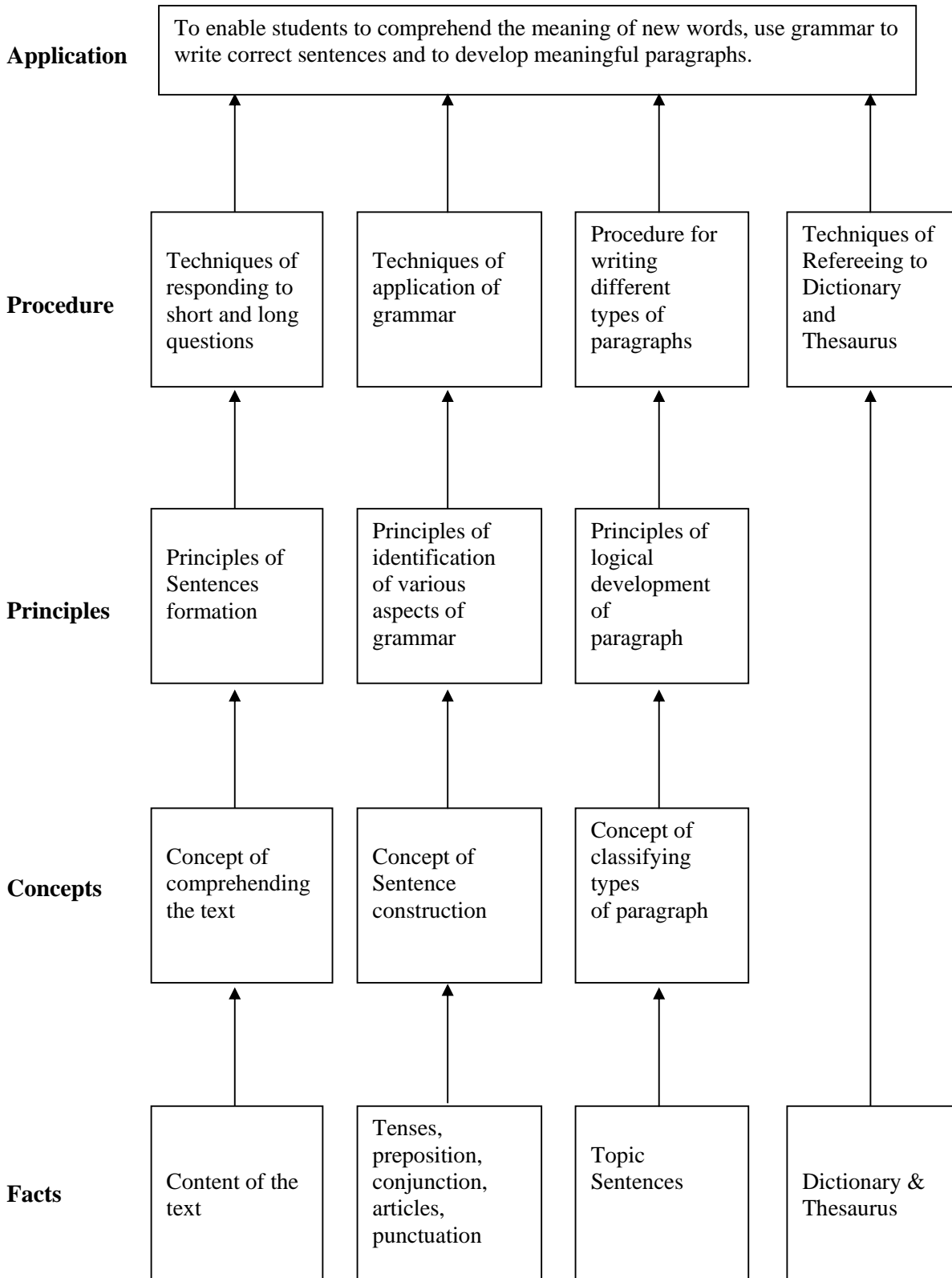
The most commonly used medium to express oneself is language. English, being a global language, is used in all the spheres of human life i.e., personal, professional and social. A diploma student is expected to be proficient in English language and pursue the existing course of study to handle the future jobs. The content of the text includes the aspects related to language skills.

General Objectives:

Students will be able to;

1. Develop vocabulary.
2. Apply the rules of grammar.
3. Comprehend the given unseen passage.

Learning Structure:



CONTENTS: Theory

Name of the Topic	Hours	Marks
PART I - Application of Grammar Specific Objective: ➤ Apply grammatical rules to form correct sentences. Contents: <ul style="list-style-type: none"> ▪ Articles: Appropriate use of definite and indefinite Articles ▪ Prepositions: To use correct Prepositions as per context ▪ Conjunctions: Co-ordinating and sub-ordinating Conjunctions ▪ Tenses: Correct usages of past, present and future tenses ▪ Active and Passive voice: Use of Active and Passive voice ▪ Direct and Indirect sentences: Conversion of direct into indirect sentence and vice versa 	12	24
PART II – Text Specific Objectives: ➤ Answer the questions based on the articles ➤ State the meanings of the given words from the articles Contents: <ul style="list-style-type: none"> ▪ Articles 	20	32
PART III - Paragraph Writing Specific Objective: ➤ Write a paragraph on a given topic Contents: <ul style="list-style-type: none"> ▪ Paragraph Writing: Elaborate and expand the ideas with cohesion, coherence and use of correct punctuation marks ▪ Types of Paragraph: Narrative, Descriptive, Technical, Comparison and Contrast ▪ Dialogue Writing: Based on various situations ▪ Speech Writing based on situations: Welcome Speech, Farewell Speech, Vote of Thanks and Introducing a Guest 	06	16
PART IV – Comprehension Specific Objective: ➤ Comprehend and provide the answers on given passages Contents: <ul style="list-style-type: none"> ▪ Comprehension of Passage: Comprehending questions and writing the answers on unseen passages 	04	12
PART V- Vocabulary Building Specific Objective: ➤ Use correct words in given situations Contents: <ul style="list-style-type: none"> ▪ Words Often Confused 	06	16

<ul style="list-style-type: none"> ▪ Collocation ▪ Prefix and Suffix ▪ Synonyms and Antonyms 		
Total	48	100

Skills to be developed in practicals:**Intellectual Skills:**

1. Select appropriate words/verbs and formulate correct sentences
2. Develop ability of correct pronunciation
3. Report writing skills

Assignments:

Journal consists of the following assignments:-

1. Punctuate 25 sentences given by the teacher.
2. Rewrite the passage/passages with correct form of verbs. [Teacher is expected to give passage /passages of verbs used wrongly [at least 25 verbs.]
3. Write 15 synonyms and 15 antonyms with the help of the thesaurus.
4. Write a paragraph each on descriptive, narrative, comparison, contrast and technical type in 75 to 100 words.
5. Write 10 words of prefixes and 10 words of suffixes and use them in sentences.
6. Select one news from any English newspaper. The news may be from any one of the following areas – Social, environmental, financial, economics, sports, etc. Prepare a summary of the news and make it presentable by using relevant photographs/graphics.
7. Students will be given ten collocations, develop three sentences for each collocation.

NOTE: The following assignment should be performed in the Language Laboratory/with the help of interactive media.

8. Listen and practice the dialogues with the help of interactive media/ interactive software.

Learning Resources:

Sr. No.	Title	Author	Publisher
1	MSBTE TEXTBOOK	-----	MSBTE
2	ESSENTIAL ENGLISH GRAMMAR	RAYMOND MURPHY	CAMBRIDGE
3	HIGH SCHOOL ENGLISH GRAMMAR AND COMPOSITION	WREN AND MARTIN	S CHAND & CO.

Course Name : All Branches of Diploma in Engineering / Technology.

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX**

Semester : First

Subject Title : Basic Science (Physics)

Subject Code : 17102

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	25@	--	--	75

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)
- Students should compulsory appear for Basic Science (Physics) & Basic Science (Chemistry) theory examination. There should be combined passing for the subject (40/100). Remaining absent in any examination of any part will not be declared successful for that examination head.
- Students should compulsory appear for Basic Science (Physics) & Basic Science (Chemistry) practical examination. There should be combined passing for the subject (20/50). Remaining absent in any examination of any part will not be declared successful for that examination head.

Rationale:

Physics is a foundation of all core technology subjects. Study of science and technology goes hand in hand. Technical knowledge can be gained more effectively using concepts of Physics. Curriculum of Engineering Physics includes fundamental concepts used in industrial applications.

Study of various properties of matter is helpful in the study of Strength of Material, Fluid mechanics, Fluid power etc., and selection of lubricant for machine parts. Property of Surface tension is applicable in Paint industry and capillarity phenomenon is useful in plumbing.

Thermal properties of matter are applicable in study of various core technology subjects like Thermal Engineering, Heat Transfer etc. Optical phenomena such as refraction and dispersion are required in higher study as well as in industry such as in characterization of material using Spectroscopy, X-ray diffraction (XRD), Atomic Force Microscopy (AFM).

Study of wave motion, Simple Harmonic Motion and their behavior is useful in field of Civil Engineering, Electronics & Communication Engineering, Mechanical Engineering and Electrical Engineering.

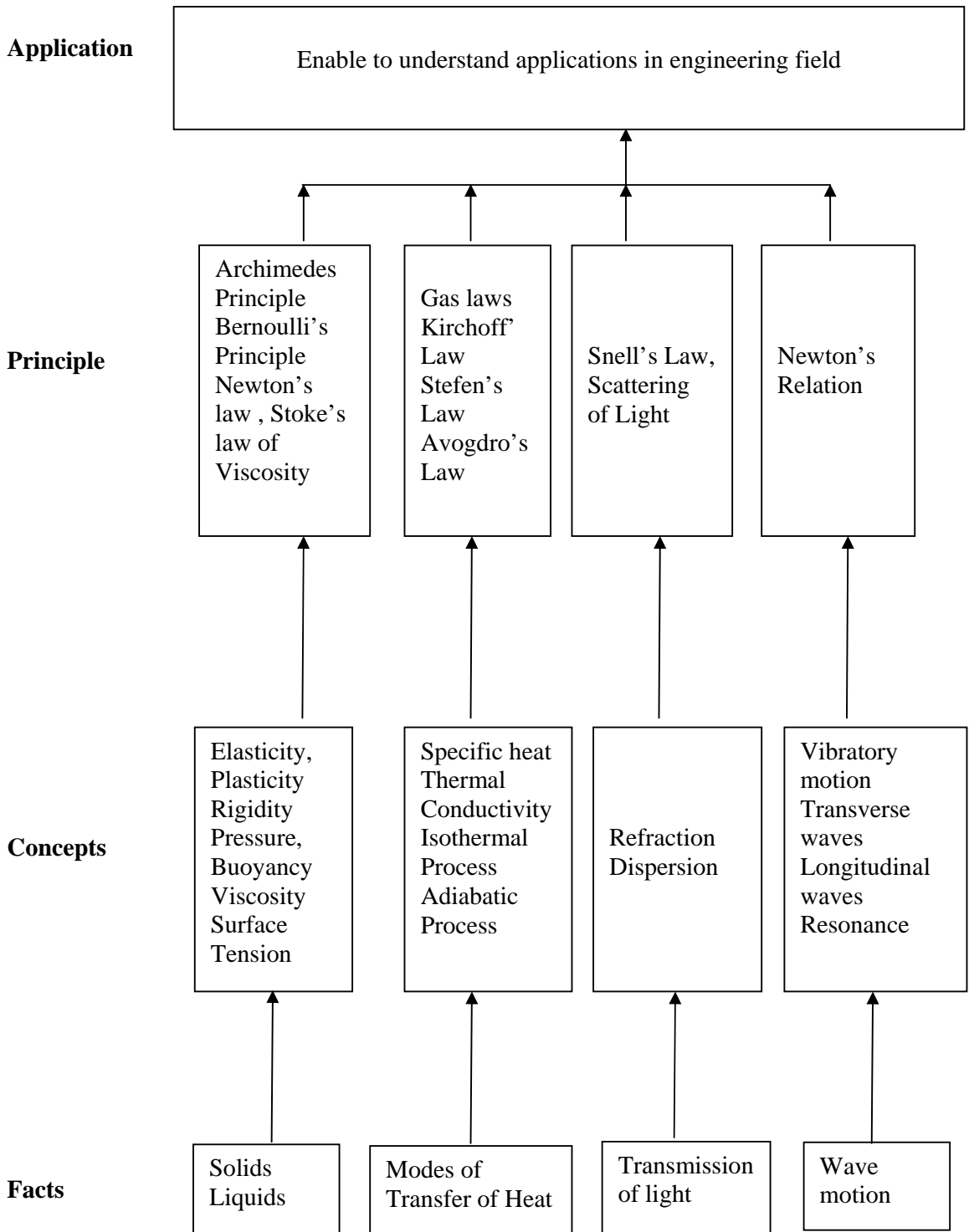
Principle of Photocell and its applications are required in study of Solar cells, Photovoltaic cells.

General Objectives: Student will be able to:

1. Understand method of selection of material for intended purpose.
2. Apply knowledge of good and bad conductors of heat in various engineering concepts.
3. Know the effect of interference between light waves.

4. Apply knowledge of characteristics of wave motion and resonance in engineering applications.
5. Apply Concept of photoelectric effect for applications like photovoltaic cell, Solar cell.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1] Properties of solids: Specific Objectives</p> <ul style="list-style-type: none"> ➤ Calculate the Young's Modulus of material of wire. • Elasticity: Definitions of deforming force, restoring force, elasticity, plasticity, Factors affecting elasticity. • Stresses: Tensile, Compressive, Volumetric and Shear stress, • Strains: Tensile, Volumetric and Shear strain. • Elastic limit, Hooke's law. • Elastic co-efficient- Young's modulus, bulk modulus, modulus of rigidity and relation between them • Stress -strain diagram, behavior of wire under continuously increasing load, yield point, ultimate stress, breaking stress, factor of safety. compressibility, Poisson's ratio. 	05	08
<p>Topic 2] Properties of liquids Specific objectives:</p> <ul style="list-style-type: none"> ➤ Determine the surface tension of the given liquid ➤ Determine the coefficient of viscosity by Stoke's method. <p>2.1 Fluid friction: [8 Marks]</p> <ul style="list-style-type: none"> • Pressure , pressure-depth relation ($P = \rho h g$), atmospheric pressure, Pascal's law, Archimedes's principle. • Viscous force, definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its SI unit. • Streamline and turbulent flow with examples, critical velocity, Reynold's number and its significance. • Up thrust force, terminal velocity, Stokes law, and derivation of coefficient of viscosity by Stoke's method, effect of temperature and adulteration on viscosity of liquid. <p>2.2 Surface tension : [4 Marks]</p> <ul style="list-style-type: none"> • Cohesive and adhesive force, Laplace's molecular theory of surface tension, Surface Tension: definition and unit, effect of temperature on surface tension. • Angle of contact, Capillarity and examples of capillary action, derivation of expression for surface tension by capillary rise method, applications of surface tension. 	09	12
<p>Topic 3] Thermal properties of matter: Specific objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish between isothermal and adiabatic process. ➤ Determine the relation between specific heats. <p>3.1 Modes of transformation of heat : [6 Marks]</p> <ul style="list-style-type: none"> • Difference between heat and temperature, definition of calorie, Absolute zero, units of temperature: °C, °F, °K, with their conversion. • Conduction, law of thermal conductivity, coefficient of thermal conductivity, good conductors of heat & insulators with suitable examples, applications of conduction. Convection, applications of convection. Radiation, applications of radiation. <p>3.2 Gas laws: : [6 Marks]</p> <ul style="list-style-type: none"> • Gas Laws: Boyle's law, Charles law, Gay lussac's law (Statement and 	08	12

mathematical equation only) <ul style="list-style-type: none"> Perfect gas equation ($PV=RT$) (No derivation), specific heat of a substance, SI unit, specific heat of gas at constant volume (C_V) specific heat of gas at constant pressure (C_P), ratio of specific heat, Mayer's relation between C_P and C_V, isothermal process, adiabatic process, difference between isothermal process and adiabatic process. 		
Topic 4] Optics Specific objectives: <ul style="list-style-type: none"> ➤ Calculate refractive index of prism. ➤ Determine the numerical aperture of optical fiber Refraction of light : [6 Marks] <ul style="list-style-type: none"> Refraction of monochromatic light, Snell's law, Derivation of prism formula, total internal reflection, critical angle. Optical fibre: principle, structure of optical fiber, propagation of light wave through optical fibre, derivation of numerical aperture and acceptance angle. 	04	06
Topic 5] Wave motion Specific objectives: <ul style="list-style-type: none"> ➤ Differentiate between transverse waves and longitudinal waves ➤ Derive expression for displacement, velocity and acceleration of a body executing SHM 5.1 Wave motion : [6 Marks] <ul style="list-style-type: none"> Definition of a wave, wave motion, wave velocity, wave period, wave frequency, wave length, vibratory motion, periodic motion, amplitude of a vibrating particle, derivation of $v = n \lambda$ Simple harmonic motion (SHM), examples of SHM, equation of SHM, expression of velocity and acceleration of a body executing SHM. Types of progressive waves: transverse and longitudinal waves with examples. 5.2 Resonance: [6 Marks] <ul style="list-style-type: none"> Stationary wave, formation of stationary wave, examples of stationary wave, characteristics of stationary waves, free and forced vibrations with examples. Resonance: definition of resonance, examples of resonance, formula to calculate velocity of sound by resonance tube method. 	06	12
TOTAL	32	50

Practical:**Skills to be developed****1) Intellectual skills-**

- Select proper measuring instruments
- Verify the principles, laws, using given instruments under different conditions.
- Read and interpret the graph.
- Interpret the results from observations and calculations.

2) Motor skills-

- Handle the instruments.
- Measuring physical quantities accurately.
- Observe the phenomenon and to list the observations in a tabular form.
- Plot the graphs.

List of experiments

1. Know your Physics Laboratory, measuring instruments and interpretation of graph.
2. Measure the dimensions of given objects using vernier caliper.
3. Measure the dimensions of given objects using micrometer screw gauge.
4. Determine Young's modulus of elasticity of metal wire by using Searle's apparatus.
5. Determine coefficient of viscosity of given liquid using Stoke's Method
6. Determine surface tension of liquid by capillary rise method using travelling microscope.
7. Determine the coefficient of thermal conductivity of copper by Searle's method
8. Determine refractive index of liquid by concave mirror.
9. Determine stiffness constant 'K' of a helical spring.

Learning Resources:**1. Reference Books:**

Sr. No.	Title	Author	Publisher
01	Engineering Physics	B.L. Theraja	S. Chand Publishers – New Delhi
02	Engineering Physics	V. Rajendran	Tata McGraw-Hill Publications
03	Conceptual Physics	P. G. Hewitt	Pearson education (Tenth edition)
04	Physics- Std XI, Std XII	-	HSC board/CBSE Board
05	Engineering Physics	R.K.Gaur and S.L.Gupta	Dhanpat Rai Publication, New Delhi.

2. Websites:

- <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
<http://physics.info>
<http://inventors.about.com/od/xyzstartinventions/a/x-ray.htm>
<http://www.kettering.edu/physics/drussell/Demos/waves/wavemotion.html>
<http://physics.usask.ca/~hirose/ep225/anim.htm>
<http://hyperphysics.phy-astr.gsu.edu/hbase/geoopt/dispersion.html>

3) Videos:

1. <http://www.youtube.com/watch?v=u5Ax1JSiEEs>: Demonstration showing **surface tension** of water using screen
2. <http://www.youtube.com/watch?v=v5h3h2E4z2Q> Demonstration showing Photoelectric effect and Photo Cell
3. <http://www.youtube.com/watch?v=42Qv8lkB-nM> Demonstration showing viscosity of various liquids
4. <http://www.can-do.com/uci/ssi2003/gas-laws.html> Demonstration of various Gas Laws

4) CD:

Educational Cd of NCERT
Educational cd of Pearson education India

5) PPT:

www.slidehare.net/donpraju/photoelectriceffect-ppt
www.khanacademy.com

Course Name : All Branches of Diploma in Engineering and Technology

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX**

Semester : First

Subject Title : Basic Science (Chemistry)

Subject Code : 17103

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	25@	--	--	75

Note:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW).
- Students should compulsory appear for Basic Science (Physics) & Basic Science (Chemistry) theory examination. There should be combined passing for the subject (40/100). Remaining absent in any examination of any part will not be declared successful for that examination head.
- Students should compulsory appear for Basic Science (Physics) & Basic Science (Chemistry) practical examination. There should be combined passing for the subject (20/50). Remaining absent in any examination of any part will not be declared successful for that examination head.

Rationale:

Basic Chemistry is the basic science which is essential to all engineering courses. For an engineer, the usage of equipments and instruments would require knowledge of chemical substances, their composition and properties. Hence the content of this subject provides knowledge of engineering materials. This knowledge also aims to bridge the theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in the field of engineering. It helps in understanding chemical and physical properties of engineering materials.

The content of this curriculum has four units which provide the knowledge of chemical bonding, mechanisms of various applications of electrochemistry. It also provides in depth knowledge of extraction processes, properties and applications of metals and alloys. The non-metallic materials like plastics, rubber, insulators are the back bone of developing industries.

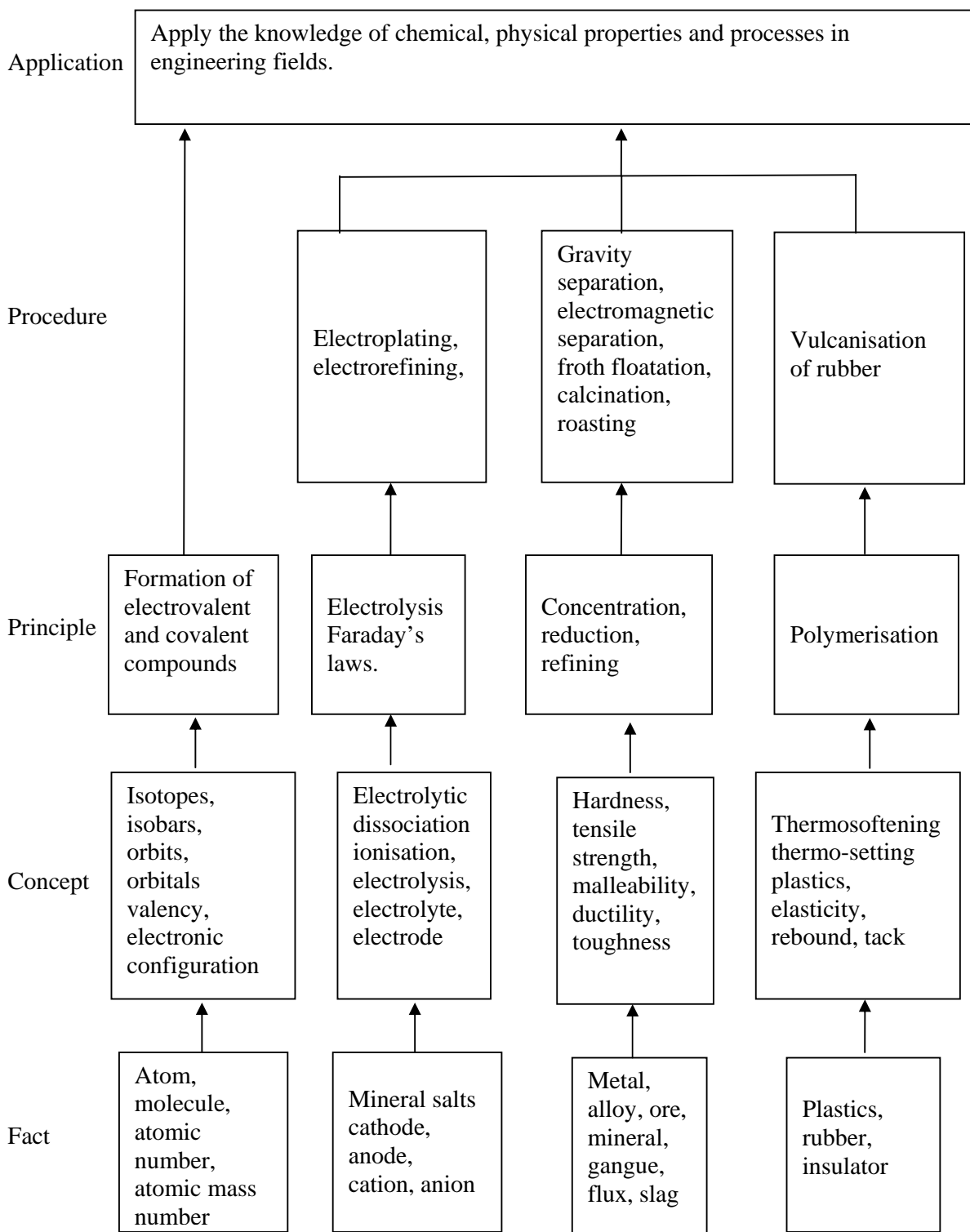
General Objectives:

The student will be able to

1. Know the concepts of valence electrons and valency of elements.
2. Apply the knowledge of electrolysis in engineering applications.
3. Understand the formation of various molecules.

4. Apply the properties of metals and alloys in engineering field.
5. Use non-metallic materials in engineering applications.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>Topic 1] Chemical Bonding: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Predict valence electrons and valency of elements. ➤ Draw schematic diagram for formation of molecules. <p>1.1 Atomic Structure : [8 Marks]</p> <ul style="list-style-type: none"> • Definition of atom, Bohr's atomic model, structure of modern atom, characteristics of fundamental particles of an atom, definition of atomic number, atomic mass number and their differences, Isotopes and Isobars: Definitions, examples and distinction, applications of carbon and cobalt isotopes. Orbits: Bohr's energy levels, sub-energy levels, s, p, d, f orbitals, shapes and description of s-orbital and p-orbital. Distribution of electrons in orbitals: Definition of electronic configuration, Aufbau's principle, Hund's rule, orbital electronic configurations (s, p, d, f) of elements having atomic number 1 to 30, <p>1.2 Valency: [4 Marks]</p> <ul style="list-style-type: none"> • Definitions of valence electrons, valency. • Definition of electrovalency, positive and negative electrovalency, formation of Electrovalent compounds-$MgO, CaCl_2$ • Definition of covalency, single, double and triple covalent bonds, formation of Covalent compounds H_2O, CO_2, N_2 	08	12
<p>Topic 2] Electrochemistry: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe the mechanism of electrolysis. ➤ Identify the role of electrodes in application of electrolysis. <p>2.1 Basic concepts of electrolysis: [4 Marks]</p> <ul style="list-style-type: none"> • Electrolyte, types of electrolyte- strong and weak electrolyte, their difference. • Ionisation and electrolytic dissociation, Arrhenius theory of electrolytic dissociation, degree of ionization, factors affecting degree of ionization. Definitions of electrolytic cell, electrodes-cathode, anode, electrode potential-oxidation potential and reduction potential. <p>2.2 Electrolysis: [10 Marks]</p> <ul style="list-style-type: none"> • Mechanism of electrolysis- Electrolysis, electrochemical series for cations and anions, • Mechanism of electrolysis of $CuSO_4$ solution by using platinum electrodes and copper electrodes • Applications of electrolysis- Electroplating of silver, electro refining of blister copper, • Faraday's laws of electrolysis: Faraday's first and second law, relation between electrochemical equivalent and chemical equivalent, Numericals. • pH and pOH: Definition of pH, pOH, pH Scale, Numericals. 	10	14
<p>Topic 3] Metals and Alloys: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify the properties of metals and alloys related to engineering applications. ➤ Describe the process of extraction of metals. <p>3.1 Metals: [8 Marks]</p>	08	12

<ul style="list-style-type: none"> • Occurrence of metals in free and combined state, definitions- mineral, ore, gangue, flux and slag, metallurgy. • Metallurgy- Detailed Flow chart for extraction of metal, • Important extraction processes-Concentration-gravity separation, electro-magnetic separation, froth floatation, calcination and roasting, Reduction-smelting, aluminothermic process, Refining- poling, electrorefining • Mechanical properties of metals- Hardness, ductility, malleability, tensile strength, toughness, machinability, weldability, forging, soldering, brazing, castability. <p>3.2 Alloys: [4 Marks]</p> <ul style="list-style-type: none"> • Definition, purposes of making alloys with examples. • Preparation methods- Fusion, Compression • Classification of Alloys- Ferrous and non ferrous alloys with examples. • Examples of alloys- Composition, properties and applications of duralumin, Woods metal, babbit metal. 		
<p>Topic 4] Non-metallic Engineering Materials:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish between thermosoftening and thermosetting plastics. ➤ List the properties of rubber ➤ State the applications of thermal insulators. <p>4.1 Polymers (Plastics, Rubber) : [8 Marks]</p> <ul style="list-style-type: none"> • Plastics: Definition of plastic, polymer, polymerisation, types of polymerisation with examples. Types of plastic- thermo softening plastics and thermosetting plastics and their difference, properties and applications of plastics. • Rubber: Types of rubber. • Natural Rubber- definition, drawbacks of natural rubber, vulcanization of rubber with chemical reaction, applications of vulcanized rubber. Synthetic rubber- definition, difference between natural and synthetic rubber, examples of synthetic rubber, properties of synthetic rubber like - elasticity, tack, and abrasion resistance, their definition and related applications. <p>4.2 Thermal Insulators [4 Marks]</p> <ul style="list-style-type: none"> • Thermal Insulators -Definition, characteristics of thermal insulators, classification- organic and inorganic thermal insulators, their examples, preparation, properties and applications of thermocole and glasswool. 	06	12
Total	32	50

Practical:**Intellectual Skills:**

1. Analyse given solution and to find the chemical properties of metallic and non-metallic ions.
2. Interpret the results of experiments or numerical values.
3. Understand the set up of the experiment.
4. Verify the laws and characteristics.

Motor Skills:

1. Handle various laboratory reagents.
2. Accurately measure proper quantity of various chemicals.
3. Observe correct colour of precipitate, evolution of gas.
4. Connect electrical circuit as per the circuit diagram.

5. Proficiently handle apparatus and equipments to perform experiments.
6. Observe the completion of reaction.

List of Experiments:

Sr. No.	Name of the experiment
1	Know your Chemistry laboratory and prepare sample solutions of different concentrations.
2	Determine the basic radical (metallic ion) and acidic radical (non-metallic ion) by qualitative analysis of given salt solution no-1.
3	Determine the basic radical (metallic ion) and acidic radical (non-metallic ion) by qualitative analysis of given salt solution no-2.
4	Determine the basic radical (metallic ion) and acidic radical (non-metallic ion) by qualitative analysis of given salt solution no-3.
5	Determine the basic radical (metallic ion) and acidic radical (non-metallic ion) by qualitative analysis of given salt solution no-4.
6	Determine the basic radical (metallic ion) and acidic radical (non-metallic ion) by qualitative analysis of given salt solution no-5.
7	Calculate the electrochemical equivalent of copper by electrolysis of copper sulphate solution using copper electrodes.
8	Determine pH value of given solutions by using pH paper, universal indicator and pH meter.
9	Prepare Phenol formaldehyde resin used in manufacturing of Bakelite plastic.

Learning Resources:**1. Reference books:**

Sr. No.	Author	Name of the book	Publisher
1	Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
2	----	Engineering Chemistry	Wiley India Edition
3	B. K. Sharma	Industrial Chemistry	Goel Publication
4	S. S. Dara	Engineering Chemistry	S. Chand Publication

2. List of web sites/ Videos and animations:**Chemical Bonding**

<http://cas.sdss.org/dr6/en/proj/advanced/spectraltypes/energylevels.asp>

<http://en.wikipedia.org/wiki/Matter>

http://en.wikipedia.org/wiki/Electron_configuration

<http://www.chemguide.co.uk/atoms/propmenu.html#top>

<http://www.chem1.com/acad/webtext/chembond/>

<http://www.footprints-science.co.uk/Chemistry.htm>

<http://www.youtube.com/watch?v=8tqfDE6vqcs&feature=related> (Ionic Bonding)

<http://www.youtube.com/watch?v=KjoQHqgza8&feature=related> (Chemical Bonding)

<http://dwb4.unl.edu/chemAnime/ECONFIG/ECONFIG.html> (electronic Configuration)

http://employees.oneonta.edu/viningwj/sims/atomic_electron_configurations_s1.html (electronic Configuration)

http://employees.oneonta.edu/viningwj/sims/atomic_electron_configurations_s2.html (electronic Configuration of Ions)
<http://www.kentchemistry.com/links/AtomicStructure/PauliHundsRule.htm> (Hunds Rule)
<http://www.quimica3d.com/animations/en-21a.php> (Orbital)
<http://www.usetute.com.au/lewisstr.html> (Lewis Structure)
<http://winter.group.shef.ac.uk/orbitron/AOs/2p/index.html> (Atomic Orbitals)
<http://ippex.pppl.gov/interactive/matter/molecule.html>
<http://www.kentchemistry.com/links/bonding/typesofBonds.htm> (Chemical Bond)

Electrochemistry

<http://en.wikipedia.org/wiki/Electrolysis>
<http://www.chem1.com/acad/webtext/elchem/>
<http://www.splung.com/content/sid/3/page/batteries>
www.teachnet-uk.org.uk/...Metals/...metals/Properties%20of%20Meta...
<http://www.authorstream.com/Presentation/aSGuest33360-286609-froth-flotation-Entertainment-ppt-powerpoint/>
<http://dwb4.unl.edu/chemAnime/index.htm>
<http://physchem.co.za/OB12-che/electrolysis.htm#copper> (Electrochemistry)
<http://www.mindzeit.com/chemistry.php>

Metals and Alloys

<http://en.wikipedia.org/wiki/Metal>

Plastic and Rubber

<http://www.tv.o.org/iqm/plastic/animations.html#> (Addition Polymerization)
<http://www.tv.o.org/iqm/plastic/animations.html#> (Condensation Polymerization)
<http://www.chemistryland.com/PolymerPlanet/Polymers/PolymerTutorial.htm> (Plastic)
<http://www.elmhurst.edu/~chm/vchembook/403rubber.html> (Rubber)

Course Name : All Branches of Diploma in Engineering and Technology

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI**

Semester : First

Subject Title : Basic Mathematics

Subject Code : 17104

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	01	--	03	100	--	--	--	100

Notes:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

Rationale:

Mathematics is the foundation of science and technology. The study of basic mathematics is helpful to understand concepts of Engineering. This subject enhances logical thinking capability. It also improves the systematic approach in solving engineering problem.

Algebra provides the language and abstract symbols of mathematics. It also helps to use that Language in real-life applications.

Matrix and Determinant topics are helpful for finding optimum solution of system of simultaneous equations which are formed in the various branches of engineering using different parameters.

Trigonometry is the study of triangles and angles.

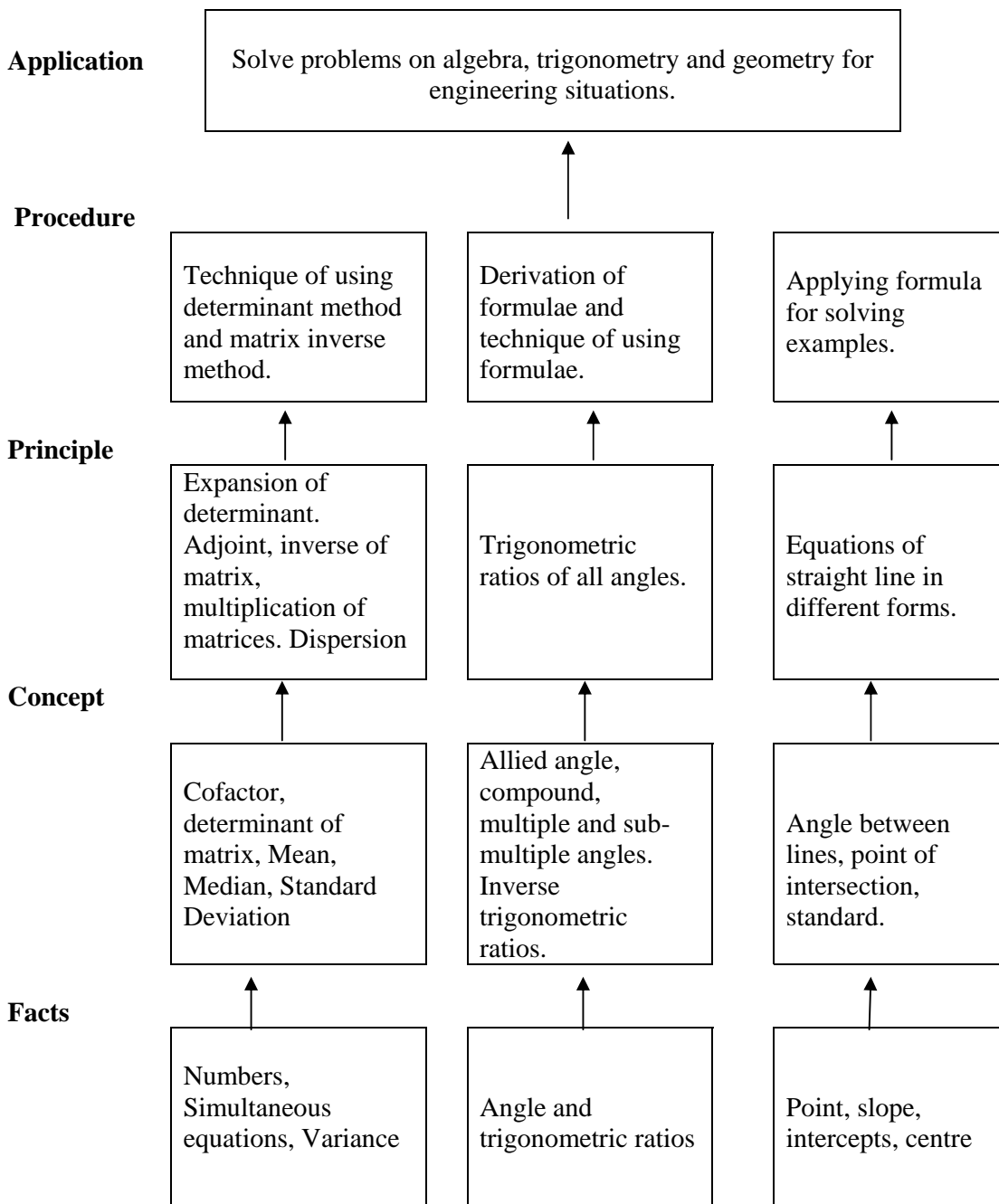
Geometry gives emphasis on understanding the deductive reasoning process. It includes writing derivations of theorems and giving geometric relationships by reasoning. Co-ordinate geometry plays an important role in Animation, AutoCAD, Computer graphics etc. Contents of this subject will form foundation for further study in mathematics.

General Objectives:

Student will be able to:

1. Apply Cramer's rule and matrix method to solve simultaneous equations in three variables.
2. Use concept of allied angle, compound angle, multiple and sub-multiple angles to solve engineering problems.
3. Use factorization and de-factorization formulae to solve examples.
4. Understand the relationship of two variables.

Learning Structure:



Theory

Topic and Contents	Hours	Marks
Topic - I Algebra		
1.1 -Determinant ----- 04 Specific objectives: ➤ Solve simultaneous equations in three variables using Cramer's rule . • Definition and expansion of determinant of order 3 . • Cramer's rule to solve simultaneous equations in three variables.	04	32
1.2 - Matrices ----- 16 Specific objectives : ➤ Perform all algebraic operations on matrices. ➤ Solve simultaneous equations in three variables. • Definition of a matrix of order m x n and types of matrices. • Algebra of matrices with properties and examples. • Transpose of a matrix with properties. • Cofactor of an element of a matrix. • Adjoint of matrix and inverse of matrix by adjoint method. • Solution of simultaneous equations containing two and three unknowns by matrix inversion method.	10	
1.3 -Partial Fraction ----- 12 Specific objectives: ➤ Find partial fraction of proper and improper fraction. • Definition of fraction, proper, improper fraction and partial fraction. • Resolve proper fractions into partial fraction with denominator containing i) non repeated linear factors, ii) repeated linear factors, iii) non repeated quadratic irreducible factors. • To resolve improper fraction in to partial fraction.	08	

Topic 2- Trigonometry		
2.1 Trigonometric Ratios of Allied, Compound, Multiple and Sub-Multiple Angles ----- 16 Specific objectives: <ul style="list-style-type: none"> ➤ Solve examples of allied angle, compound angle, multiple and sub-multiple angles. • Trigonometric ratios of any angle. • Definition of allied angle, compound, multiple and sub-multiple angles. • Trigonometric ratios of above angles with proofs. Simple examples 	10	40
2.2 Factorization and De-factorization Formulae ----- 12 Specific objectives: <ul style="list-style-type: none"> ➤ Derive factorization and de-factorization formulae to solve examples. • Formulae for factorization and de-factorization with proof and examples. 	08	
2.3 Inverse Trigonometric Ratios ----- 12 Specific objectives: <ul style="list-style-type: none"> ➤ Solve examples of inverse trigonometric ratios. • Definition of inverse trigonometric ratios. • Principal value of inverse trigonometric ratios. • Relation between inverse trigonometric ratios with proof and examples. 	08	
Topic 3- Co –Ordinate Geometry		
3.1 Straight Line ----- 16 Specific objectives: <ul style="list-style-type: none"> ➤ Solve problems with given condition. • Angle between two lines with proof. Examples. • Condition of parallel and perpendicular lines. • Point of intersection of two lines, equation of line passing through point of intersection with given condition. • Perpendicular distance between point and line with proof and examples. • Distance between two parallel line with proof and examples. 	10	16
Topic 4 - Statistics		
4.1 Measures of Dispersion ----- 12 Specific objectives : <ul style="list-style-type: none"> ➤ Find the range, mean deviation, standard deviation and consistency of any data. • Measures of dispersion - range, mean deviation from mean and median, and standard deviation. • Variance and its coefficient. • Comparisons of two sets of observations. 	06	12
Total	64	100

Tutorials:

Note: 1) Tutorials are to be used to get enough practice.

1) Make group of 20 students and for each group minimum 10 problems are to be given.

List of tutorial:

Sr. No.	Topic for tutorial
1	Determinant.
2	Matrices (Algebra of matrices)
3	Matrices (Adjoint , inverse and solution of equations using matrix inversion method)
4	Partial fraction.
5	Trigonometric ratio of allied, compound, multiple and sub-multiple angles.
6	Factorization and de- factorization formulae.
7	Inverse trigonometric ratios.
8	Straight line.
9	Statistics(Measure of Dispersion)

Learning Resources:**1) Books :**

Sr. No	Title	Authors	Publication
1	Mathematics for Polytechnic	S.P. Deshpande	Pune Vidyarthi Griha.
2	Trigonometry	S. L. Loney	S. Chand Publication
3	Matrices	Ayres	Schuam series McGraw Hill
4	Higher Engineering Mathematics	B. S. Grewal	Khanna publication
5	Engineering Mathematics	S. S. Sastry	Prentice Hall of India

2) Websites :**i) www.khan Academy**

Course Name : All Branches of Diploma in Engineering and Technology.

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX**

Semester : First

Subject Title : Engineering Graphics

Subject Code : 17001

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	04	--	--	50#	--	50@	100

- Notes: -**
- 1) Students should use the A3 size sketchbook for class works.
 - 2) Use approximately 570mm×380mm size drawing sheet for term work.

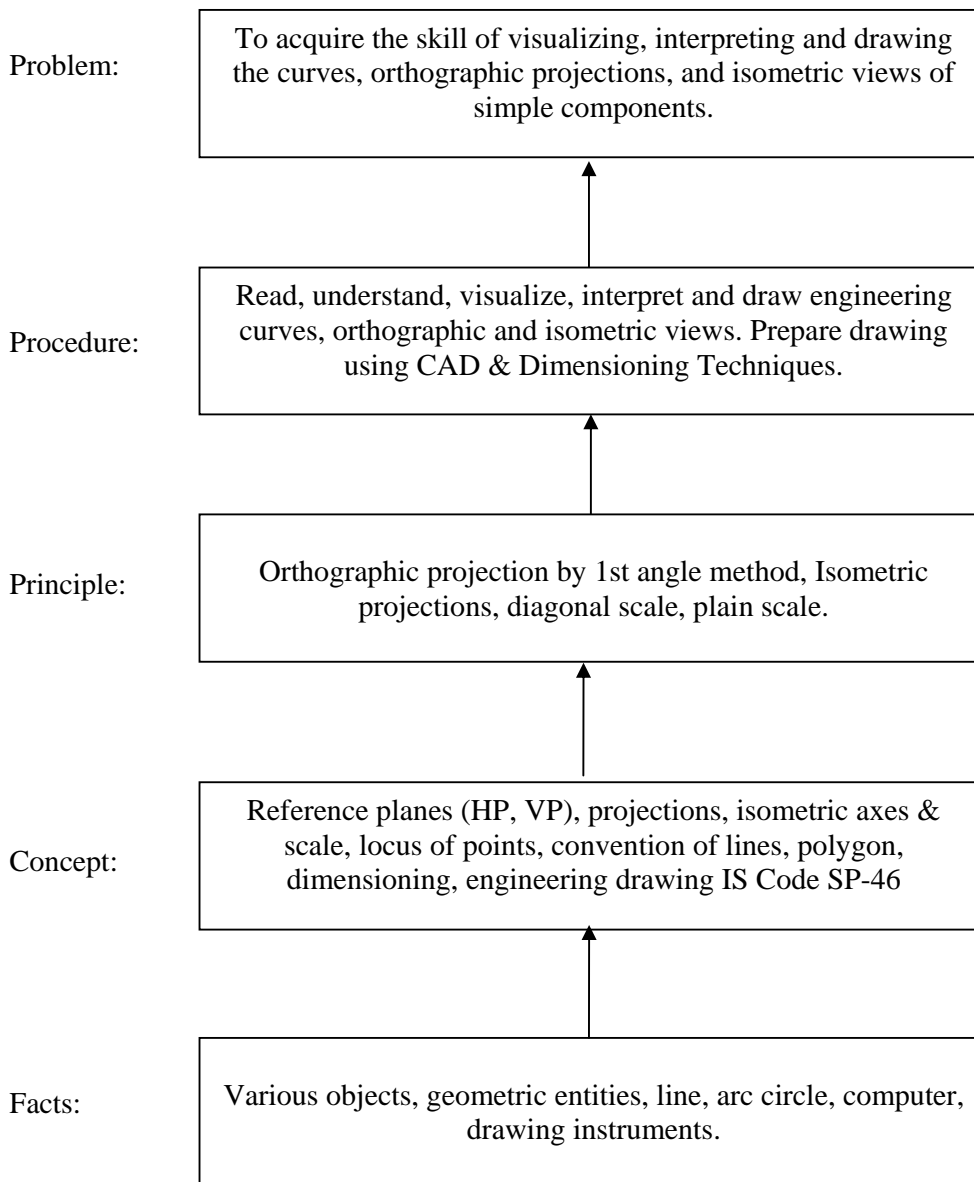
Rationale:

Engineering Graphics is the language of engineers. The concepts of Engineering Graphics are used to develop, express the ideas, and convey the instructions which are used to carry out jobs in the field Engineering. The course illustrates the techniques of graphics in actual practice. This preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing drafting and sketching skills of students.

Objectives:

The student after studying this subject will be able to:-

- 1) Draw different engineering curves and know their applications.
- 2) Draw orthographic projections of different objects.
- 3) Visualize three dimensional objects and draw Isometric Projections.
- 4) Draw simple geometrical figures using CAD package.

Learning Structure:

Theory:

Name of the Contents	Hours
<p>1. Principles of Drawing Specific Objective</p> <ul style="list-style-type: none"> ➤ Use Instruments for drawing, Scales, Lines, & there applications. ➤ Draw a basic 2-D geometrical entities using CAD. <p>1.1 Drawing Instruments and their uses</p> <ul style="list-style-type: none"> • Standard sizes of drawing sheets (ISO-A series) • Letters and numbers (single stroke vertical) • Convention of lines and their applications. • Scale (reduced, enlarged & full size) plain scale and diagonal scale. • Dimensioning technique as per SP-46 (Latest edition) – types and applications of chain, parallel and coordinate dimensioning <p>1.2 Introduction to CAD software (Basic commands like draw, modify).</p> <ul style="list-style-type: none"> • Advantages of CAD • Geometrical constructions 	06
<p>2. Engineering curves & Loci of Points. Specific Objective</p> <ul style="list-style-type: none"> ➤ Draw Conic curves, involute, Cycloid & know their applications ➤ Draw helix, spiral, & loci of points from given data. <p>2.1 Conic Section</p> <ul style="list-style-type: none"> • To draw an ellipse by Arcs of circle method & Concentric circles method. • To draw a parabola by Directrix and focus method & Rectangle method • To draw a hyperbola by Transverse Axis and focus method & rectangular hyperbola (Inclined axes). <p>2.2 Engineering curves</p> <ul style="list-style-type: none"> • To draw involutes of circle & pentagon, • To draw a cycloid, epicycloids, hypocycloid • To draw Helix & Archimedean spiral. • Loci of points on any link of (i) 4 bar mechanism and (ii) Single slider crank mechanism with given specifications. 	09
<p>3. Orthographic projections Specific Objective</p> <ul style="list-style-type: none"> ➤ Visualize, interpret & draw orthographic views from given pictorial view. <ul style="list-style-type: none"> • 3.1 Introduction to Orthographic projections. • 3.2 Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) – elevation, plan and end view • 3.3 Selection of section plains and drawing sectional view (simple object) 	08
<p>Chapter 4. Isometric projections Specific Objective</p> <ul style="list-style-type: none"> ➤ Visualize interpret & draw isometric view from given orthographic views <ul style="list-style-type: none"> • 4.1 Isometric scale, comparison of true scale with isometric scale • 4.2 Conversion of orthographic views into isometric View / projection 	09
Total	32

Practical:**Skills to be developed for practical:****Intellectual skills:**

1. To develop ability to solve problems on geometrical constructions.
2. To develop ability to differentiate between conic and curves
3. Able to interpret the given mechanisms and locus of points.
4. Develop ability to interpret first angle projection method.
5. To interpret and able to solve problem on orthographic projection of given object.
6. Develop ability to differentiate between isometric view and isometric projections.
7. To differentiate between Isometric scale and true scale

Motor Skills:

1. To develop ability to draw the geometrical constructions by computer. Using CAD
2. To develop ability to draw different types of curves.
3. Develop ability to draw orthographic projections by first angle projection method
4. Develop ability to draw isometric views and isometric projections from given orthographic views of an object using computer.

List of Practical:

List of Practical	
1. Geometrical Constructions Using CAD - (1 Sheet) Using CAD, draw the following figures with dimensions- Rectangle, circle, pentagon, hexagon, and two composite figures involving tangential exercises.	
2. Engineering curves & Loci of points - (1 Sheet) i) Three different curves are to be draw using any one method. ii) Draw locus of point on anyone mechanism	
3. Orthographic projections - (Total 2 Sheets) Two objects by first angle projection method – - Full orthographic views -One sheet - Sectional orthographic views–One sheet	
4. Isometric projection - (Total 2 sheets) - Isometric views of two objects- One sheet - Isometric projection of two objects – One sheet	

Learning Resources: -**1. Books: -**

Sr. No.	Author	Title	Publication
1	N. D. Bhatt	Engineering Drawing	Charotar Publishing House 2010
2	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3	D.Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4	M.B.Shah,	Engineering Drawing	Pearson, 2010

	B.C.Rana		
5	R. K. Dhawan	Engineering Drawing	S. Chand Co., Reprint 2010
6	K. L. Narayan, P. Kannaiah	Text Book on Engineering Drawing	Scitech Publications, 24 th Reprint August 2011
7	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age Publication, Reprint 2006
8	IS Code, SP – 46	Engineering Drawing Practice for schools and colleges	

2. Video Cassettes / CD's

1. Instructional / Learning CD developed by ARTADDICT.

Course Name : All Branches of Diploma in Engineering and Technology.

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/FE/IC/IE/IF/IS/IU/ME/
MH/MI/MU/PG/PS/PT**

Semester : First

Subject Title : Computer Fundamentals

Subject Code : 17002

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	04	--	--	50* #	--	25@	75

*** On Line Examination**

Rationale:

Since early 21st Century the use of Computer has been so rapidly that it is difficult to think of an area where computers are not being used. It is very desirable that everyone should have good knowledge of computer.

Main purpose of this subject is how to use a computer for basic needs. This subject covers application softwares like MS-Word, MS-Excel, MS- PowerPoint.

It is a gateway to wonderful world of information and part of various applications like business, academic, hospitals, construction, designing, chemical fields and many more.

Intellectual Skills:

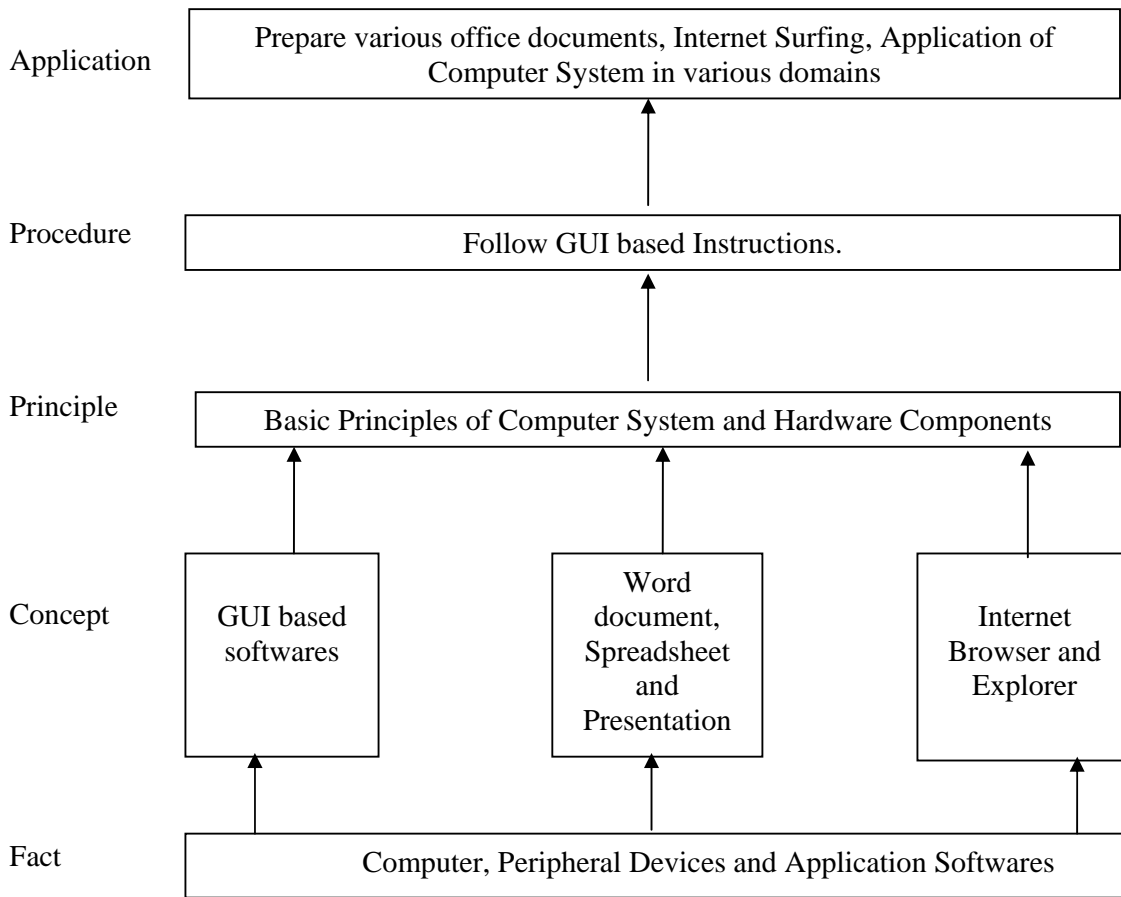
Students should be able to:

1. Use of Operating System.
2. Use MS- Word, MS-Excel, MS- PowerPoint, efficiently for documentation.
3. Use browser for accessing Internet.

Motor Skills:

Handle Personal Computer System.

Learning Structure:



Contents:**Note:**

1. It is suggested that the separate batch should be formed for students having less computer background.
2. Contents of theory are to be taught in practical period with the help of LCD projector.

Sr. No	Activity/Topics	Hours
1	<ul style="list-style-type: none"> • Algorithms-Introduction, Three Basic Operations, Procedures and Programs 	1
2	<ul style="list-style-type: none"> • Data Representation- Representing different symbols, minimizing errors, Representing more Symbols, Generic Formula, the ASCII code, the EBCDIC code, Rules of Decimal number System and its conversion to binary • Multimedia- Digital images, analog to digital conversions, digital audio and digital video 	2
3	<ul style="list-style-type: none"> • Binary Arithmetic- binary addition, binary subtraction, multiplication and division • Logic Gates- The need for derived gates, Half adder, Full adder, Logical operations 	2
4	<ul style="list-style-type: none"> • Data Storage- memory-Main Memory, Memory data transfer, MBR, Memory decoders -1x2,2x4...10x1024, MAR, Address, Data and Control Buses, Load and Store Instructions, Word and Word Length, RAM and ROM, Cache Memory • Data Storage- Disk- Memory Hierarchy, Disk basics – Cylinders, Tracks, Surfaces, Sectors, Relationship between logical and physical records, Disk Controller Architecture, Sector format, Formatting Process, Seek Time, Rotational Delay and Transmission time, The relationship between Application program, Operating System, Disk Controller and the actual disk, CDs, DVD • VDU and Printers-Human-computer interface, Keyboard, Raster Scanning, Frame Buffer, Basics of Graphics, Black and White/ Color Terminals, Text based terminals, LEDs/LCDs, Inkjet Printers, Laser Printer 	3
5	<ul style="list-style-type: none"> • Computer Architecture-CPU Registers, Multiplexers, ALU, Instruction Format, Instruction Decoding, Instruction Execution Cycles • Operating System-Concepts of system calls, Multiprogramming, Concepts of Context Switch, Different Services of Operating System, Information Management , Process Management (Process states, Process State Transition, Process Scheduling), Memory Management (Fixed Partition, Variable Partition, Paging, Demand Paging) 	2
6	<ul style="list-style-type: none"> • Classification of Computers and applications- Characteristics of Computers, What Computers can do, What computers can't do, Classification of Digital Computer Systems, Anatomy of a Digital Computer 	1
7	<ul style="list-style-type: none"> • Introduction to Computer Usage of computer system in different domains like office, book publication, ticket reservation, banks etc. Components of PC – Mouse, keyboard, CPU, monitor, printers, scanners, modem, memory, sound cards, pen drives. 	1

8	<ul style="list-style-type: none"> Introduction to Operating System(Windows 7) Working with Windows desktop, icons, taskbar, menu bar options, My Documents, My Computer, Control Panel, Recycle bin Concept of drives, folders, files Windows accessories – Notepad, WordPad, paint, clock, calendar, calculator 	1
9	<ul style="list-style-type: none"> GUI Based Software – MS – Office 2010 MS-Word – Opening menus, toolbars, opening and closing documents, clipboard concept MS – Excel – Working and manipulating data with excel, formulas, functions, chart and its types MS – PowerPoint – Working with PowerPoint and presentation ,Changing layout, Graphs , Auto content wizard ,Slide show, Animation effects, Normal, outline, Slide sorter, Reading view. 	2
10	<ul style="list-style-type: none"> Internet History of Internet, equipments required for Internet connection, browser (Internet Explorer, Mozilla and Firefox, Google Chrome) 	1
Total		16

List of Practicals / Activities

Sr. No	Practicals / Activities
1	<ul style="list-style-type: none"> Demonstration of above peripheral devices to students
2	<ul style="list-style-type: none"> Moving from one window to another window Opening task bar buttons into a window. Arranging icons on the desktop and create shortcuts.
3	<ul style="list-style-type: none"> Creating folders and files. Copy, rename, delete files and folders. Moving folders and files from one drive to another drive.
4	<ul style="list-style-type: none"> Create and edit notepad document. Create and edit WordPad document. Create paint file by using different drawing tools.
5	<ul style="list-style-type: none"> Creating, editing, saving word document. Entering and formatting text. Paragraph formatting, use bullets and numbering. Page formatting – page margins, page size, orientation, page break, headers and footers. Create tables, insert, and delete rows and columns. Printer installation and printing document. Create and print mail merging address for envelop and letters.
6	<ul style="list-style-type: none"> Create, open and print worksheet with page setup and print options. Enter data and format cells. Select, insert, delete cells, rows and columns. Insert formulas, functions and named ranges in worksheet. Create chart of different types.
7	<ul style="list-style-type: none"> Create a simple text slide using formatting, Selecting a slide layout. And insert pictures & backgrounds. Insert auto shapes, clip-arts and form group/un group objects from slides. Apply slide transitions and slide timings and animation effect for slide show
8	<ul style="list-style-type: none"> Perform Internet connection.

	<ul style="list-style-type: none"> • Create own e-mail id, send and receive mail with attachment. • Searching information using search engine (Google, MSN, bing etc.) • Do Internet chatting and understand the chat toolbar. • Organize favorite websites in different browsers.
--	--

Learning Resources:**1. Books:**

Sr. No	Author	Title	Publisher
1	Achyut Godbole	Demystifying Computer	TMH
2	Alexis Leon	Introduction to Computers	Vikas Publishing House
3	Vikas Gupta	Comdex Computer Course Kit (Windows 7 with Office 2010)	Dreamtech Press
4	Steve Schwartz	Microsoft Office 2010	Pearson
5	Elaine Marmel	Microsoft Project 2010 (Bible)	Wiley India
6	Preppernau Cox	Windows 7 Step by Step	PHI

2. Links:

1. <http://www.psexam.com>
2. <http://www.gcflernfree.org/office>
3. <http://www.softwaretrainingtutorials.com/ms-project-2010.php>
4. <http://www.7tutorials.com>

List of Equipments/Tool:**Hardware Tools-**

1. Computer System (Pentium –IV or higher version)
2. Printer
3. Modem
4. Pen Drive

Software Tools-

1. Windows- 7 (Operating System)
2. MS-Office 2010
3. MS- Project 2010
4. Internet Explorer/Mozilla/Chrome/Firefox

Guidelines for Online Exam:

1. Total duration for online examination is an hour.
2. There will be theoretical multiple choice questions.
3. There will be certain practical performance based questions.

Course Name : Civil Engineering Group**Course Code : CE/CR/CS/CV****Semester : First****Subject Title : Basic Workshop Practice (Civil)****Subject Code : 17003****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Note: Related theory to be taught during practicals**Rationale:**

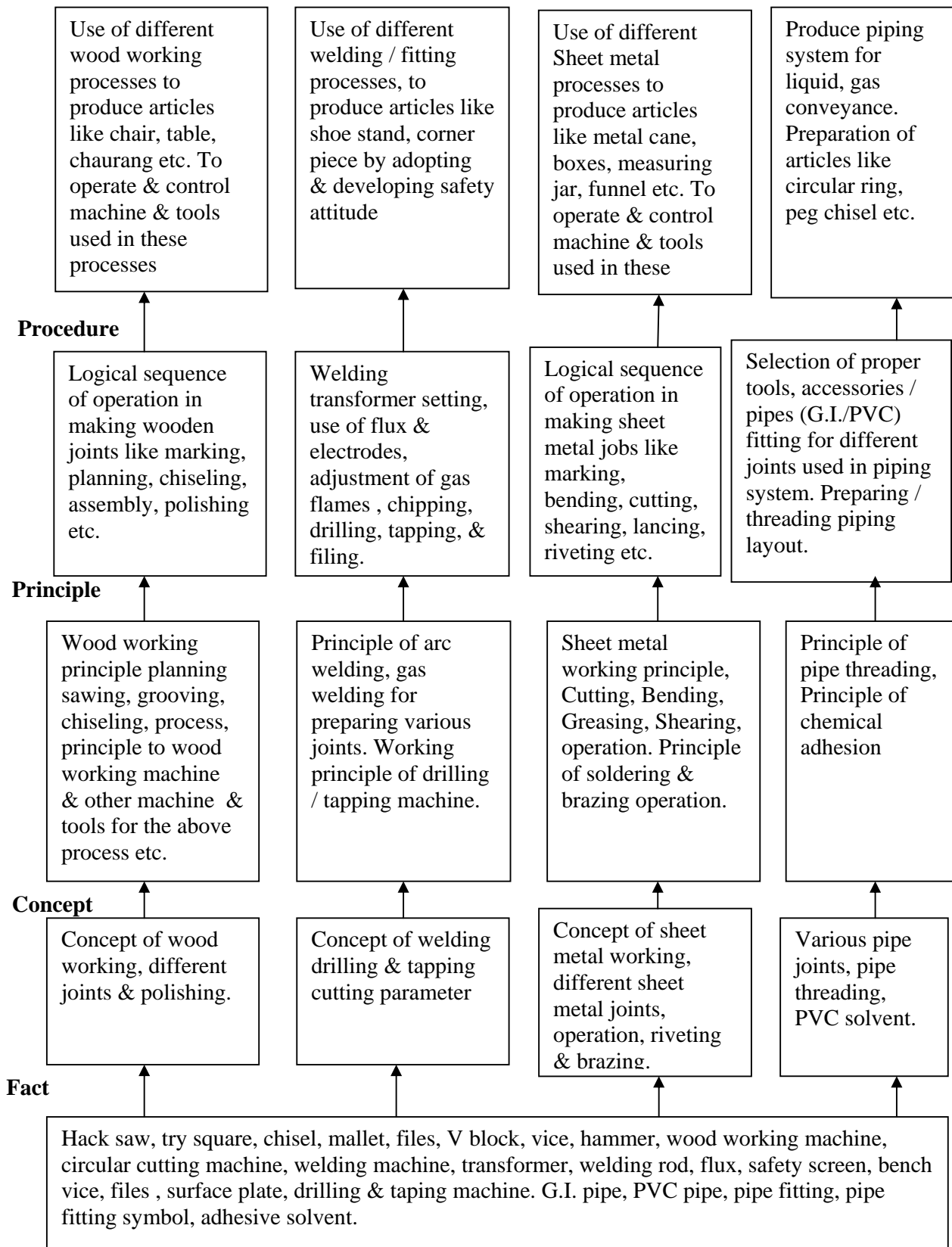
Civil diploma technician is expected to acquire basic workshop skills and should be able to exhibit them whenever needed during execution of various works. The students are required to identify, operate and control various machines in different shops of workshop. Selection of appropriate tools and different equipments will be useful for performing various jobs in carpentry, welding, fitting, plumbing and sheet metal which are needful for different construction works.

Knowledge of carpentry will be useful in joinery work of doors, windows and other wooden structures. Knowledge of welding will be useful for fabrication of grill work, prefabricated steel staircase, railing etc. Topic on fitting will be useful in steel structural works. Plumbing will be useful for conveying liquid and gas. Knowledge of sheet metal shop will be useful in preparation of rain water sheds.

Thus knowledge of welding, fitting, carpentry, plumbing and sheet metal will enable the diploma technician to execute the construction work properly as and where required.

Learning Structure:

Application



Practicals:**Objectives:****Skills to be developed:****Intellectual skills:**

1. Interpret job drawing.
2. Identify proper material, tools, equipments and machines.
3. State the meaning of caulking, fullering, threading etc.
4. Check the job for confirming desired dimension and shape.

Motor skills:

1. Set tools, work piece and machine for desired operation.
2. Operate tools and machines complete job as per job drawing in allotted time.
3. Use safety equipments and follow safety procedures during operation.

1. CONTENTS:**Guidelines for Conduct of Workshop Practicals**

1. Assignment given in the practical content shall be performed by the students under the guidance of workshop Superintendent / subject teacher, Various tools, different Process (operations) shall be exhibited to the students before writing the assignment. The teacher shall guide the student for calculating the cost of articles Prepared.
2. Term work shall consists of
 1. File containing the assignment.
 2. Job drawing, working process etc. written in workshop diary.
 3. The term work assessment shall be done with following norms.
Assignments-10 Marks, Workshop diary and job prepared-40 Marks, Total-50 Marks
3. Safety precautions should be observed while working in workshop.
4. Batch shall be formed depending on volume of work.
5. Student shall be guided to calculate the cost of materials and labors required for their job from the drawing.

Shop And Contents	Hours
<p>SHOP : 1 WOOD WORKING SHOP</p> <p>Contents</p> <p>Assignment -----02+02</p> <ol style="list-style-type: none"> 1. Draw sketches of different carpentry tools, wood turning lathe, Label the sketch, write their uses and tools. 2. List five different types of woods used for carpentry. State their Properties. <p>Demonstration-----02+02</p> <ol style="list-style-type: none"> 1. Observe operation of different carpentry tools and different Wood working processes like sawing, planning, marking, Chiseling, grooving and wood turning. 2. Practice different wood working processes. <p>Job-----08</p> <ol style="list-style-type: none"> 1. Prepare one simple job involving any one joint like mortise and Tenon, dovetail, bridle, half lap etc. 2. Prepare one simple job on turning like rolling pin, chisel handle. 	16
<p>SHOP : 2 WELDING SHOP</p> <p>Contents</p> <p>Assignment-----02</p> <ol style="list-style-type: none"> 1. Describe in brief the process of ARC welding, gas welding, gas Cutting. State the situation where each is used. 2. List points for selection of welding rod material, size of welding Rod, different types of flame, sketch of elementary symbolic Representation in welding. 3. Safety precautions in welding, safety equipment and it's use in Welding process. <p>Demonstration-----02</p> <ol style="list-style-type: none"> 1. Observe operation of ARC welding, gas welding, gas cutting Rebuilding of broken parts with welding. <p>Job-----08</p> <ol style="list-style-type: none"> 1. Prepare one simple job involving butt and lap joint. 	12
<p>SHOP : 3 FITTING SHOP</p> <p>Contents</p> <p>Assignment-----02</p> <ol style="list-style-type: none"> 1. Draw the sketches of marking/measuring, cutting, holding and Striking tools. Write their purpose and care to be taken. 2. Write component parts and working principle of drilling Machine and its use. 3. Prepare list of power tools, tapping dies, raw sketches of the Same and write the use. <p>Demonstration-----02</p> <ol style="list-style-type: none"> 1. Observe different fitting, power tools and drilling machine. 2. Observe different operations in fitting shop like chipping filing Right angle making, drilling, cutting, tapping. <p>Job-----08</p> <ol style="list-style-type: none"> 1. Prepare one simple job involving practice of chipping, filing, Drilling, tapping, cutting etc. 	12

Shop And Contents	Hours
<p>SHOP : 4 PLUMBING SHOP</p> <p>Contents</p> <p>Assignment-----02</p> <ol style="list-style-type: none"> 1. Identify different types of pipes as G.I., PVC, flexible, rigid As per material used and function. 2. Identify different types of pipe fittings and accessories required For different types of pipes. 3. Identify different types of adhesives, solvents and chemicals. <p>Demonstration-----02</p> <ol style="list-style-type: none"> 1. Observe the operations of PVC pipe fittings using adhesives, Solvents and chemicals. 2. Preparation of actual drawing for pipeline layout for PVC And G.I. pipe. Calculation of bill of materials. 3. Preparing actual pipeline layout for PVC, G.I. pipe. <p>Job-----08</p> <ol style="list-style-type: none"> 1. Prepare one job of simple pipe joint with nipple coupling for Pipe. Pipe threading using standard die sets. 	12
<p>TOPIC : 5 SHEET METAL SHOP</p> <p>Contents</p> <p>Assignment-----02</p> <ol style="list-style-type: none"> 1. Draw the sketches of various types of tools, equipments and Accessories used in sheet metal shop. Also mention their use. 2. Write safety precautions to be taken while working in shop. <p>Demonstration-----02</p> <ol style="list-style-type: none"> 1. Observe different sheet metal operations like sheet cutting, Bending, edging, curling, lancing, soldering and riveting. <p>Job-----08</p> <ol style="list-style-type: none"> 1. Prepare one simple job involving sheet metal operations and soldering and riveting. 	12
Total	64

Learning Resources:**1. Books:**

Sr. No.	Name of Author	Name of Books	Publisher
01	S. K. Hajara Chaudhary	Workshop Technology	Media promoters and publisher, New Delhi
02	B. S. Raghuwanshi	Workshop Technology	Dhanpat rai & Sons, New Delhi
03	R. K. Jain	Production Technology	Khanna Publishers, New Delhi
04	S. G. Deolalilkar	Plumbing (Design & Practice)	M C Grawhill New Delhi
05	H. S. Bawa	Workshop Practice II Edition	M C Grawhill New Delhi
06	--	Kent's Mechanical Engineering Hand book	John Wiley and sons New York.

2. CBI Packages Developed by NITTTR Bhopal

3. Transparencies

4. Website

- a) www.copper.org
- b) www.wikipedia.com/plumbing
- c) www.howstuffwork.com

Course Name : Electrical Engineering / Electrical Power System.

Course Code : EE/EP

Semester : First

Subject Title : Basic Workshop Practice (Electrical)

Subject Code : 17004

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPERS HRS.	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Notes: Related theory will be taught during practical period.

Rationale: -

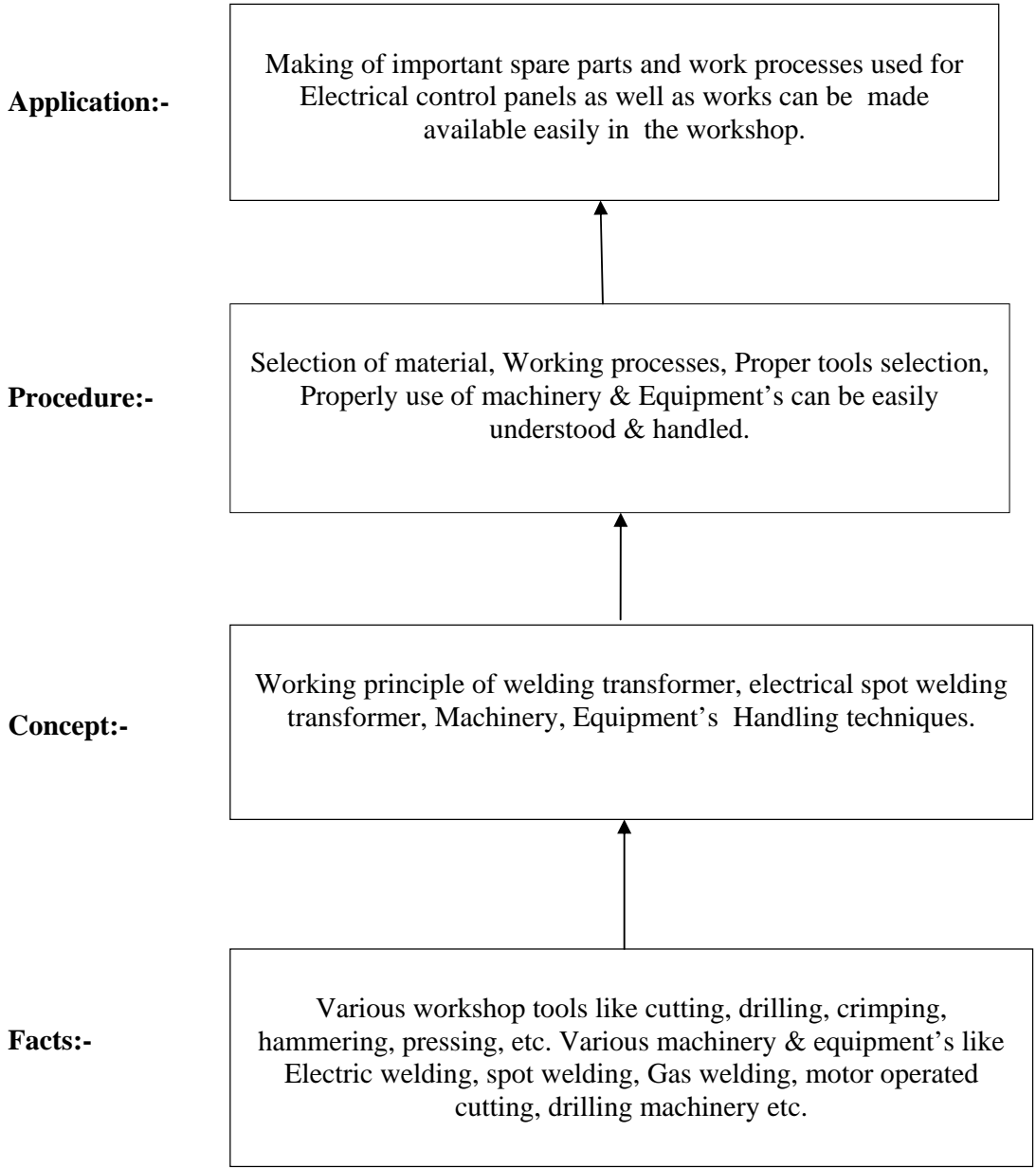
For a diploma engineer in Electrical Engineering it is essential to know some basic workshop skills. In the world of work students are required to supervisor, maintenance of equipment, where he needs the knowledge of basic workshop skills such as welding, Soldering, Sheet metal working, drilling, tapping etc.

General Objectives:

The Students will be able to: -

- Use the knowledge of sheet metal working & welding for preparing Panels, Switch boxes etc.
- Use various drills for electrical wiring Installation.
- Make Joints for various types of wiring such as casing capping, conduit wiring & mounting of accessories& cabling.

Learning Structure:



Practicals:

Name of The Topic and Contents	Hours
01. Demonstration of Power Tools & Practice of Utility Items. <ul style="list-style-type: none"> • Advanced power tools e.g. Pneumatic Spanner, Lifting. • Tools for cutting & drilling [Manually operating tools & table mounted motor operated]. • Electrical wiring tools & accessories e. g Portable drilling ,Hammering, Crimping etc. 	04
02. Welding Shop. Introduction & Demonstration to joints of metal and sheet metal pieces, various type of welding machines ,How to use , current setting, Earthing connections etc.& any one composite job involving Butt, Lap joints from the following working pieces of . <ul style="list-style-type: none"> • Window Frame, Table Frame, Supporting Frame.[Electric welding] • Sheet metal pieces.[Gas & OR Electric spot welding] 	12
03. Plumbing Shop. Demonstration of PVC pipe joints with various PVC fittings & accessories.One job per one group of 05 students.	08
04. Sheet Metal Shop. Introduction to sheet metal works like Bending, Cutting, Welding etc. & any one composite job from the following list along with guidance of supervisor & concerned teacher. [Note- Job shall be prepared of slandered size similar to sealable or marketable article] from list of article given below. One job per one group of 05 students. <ul style="list-style-type: none"> • Display board, • Panel board, • Switch box. 	12
05. Turning Shop. The turning job work shall be initially explained with pre designed drawing & following three parts of work should be done on one job per group of five students <ol style="list-style-type: none"> 1] Introduction& Demonstration with utility practice of various turning activities like, Marking, Measuring, Cutting, Holding, & Striking tools. 8 Hrs 2] Any one job from following list. One job per one group of 05 students. <ul style="list-style-type: none"> • Plain & Taper turning. • Threading & Knurling 10 Hrs 3] Job related to Drilling & Tapping. One job per one group of 05 students. 10 Hrs 	28
Total	64

Skills to be developed:**Intellectual Skills:**

- Selection of material, Tools, & Equipments for the process of Cutting, Drilling, Welding, Turning, & Tapping on metal & sheet metal job works
- Method of welding joints, Fabrication process,
- Interpretation of Drawing

Motor Skills:

- Marking, Measuring, Holding, Striking, cutting, Drilling, Tapping process.
- Handling of power tools, Machinery for various processes

Learning Resources:**Books:**

Sr. No.	Name of the Author	Title of the book	Edition	Name of the Publisher
1.	S.K.HazaraChoudhari.	Workshop Technology.	--	Media promotion & Publication New Delhi.
2.	B.S. Raghuvanshi.	Workshop Technology.	---	Dhanpatrai& sons New Delhi
3.	R.K. Jain.	Production Technology.	--	KhannaPublication New Delhi.
4.	H.S.Bawa.	Workshop Technology.	--	Tata Mc-Graw, Hill Publication New Delhi.

- ISO, IS, BS standards, Data Sheets, IE Rules Handbook, Charts, Models, CDs, Transparencies, Websites, PPTs.

Course Name : Electronics Engineering Group

Course Code : DE/ED/EI/EJ/EN/ET/EV/EX/IC/IE/IS/TU/MU

Semester : First

Subject Title : Basic Workshop Practice (Electronics Group)

Subject Code : 17005

Teaching & Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Rationale:

Electronic diploma technicians are expected to know basic workshop practice like wood working, sheet metal, fitting and soldering. This subject will develop skills in handling various mechanical, electrical and electronics tools.

The students are required to select and use various tools & equipments related to wood working, sheet metal process, soldering and desoldering techniques required in electronic project work.

General Objectives:

After studying this subject student will be able to:

1. Read and interpret the drawing.
2. Draw sketch for given job.
3. Use specification tables.
4. Decide Sequence of procedure.
5. Recognize, identify and use of various tools used in soldering.
6. Use of soldering technique for efficient repair work.

Skills to be developed:

Intellectual Skills:

1. Ability to read job drawing.
2. Ability to identify and select proper material, tools, equipments and machine.
3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.
4. Ability to select proper material, tools and techniques used in soldering.

Motor Skills:

1. Ability to set tools, work piece, and machines for desired operations.
2. Ability to complete job as per job drawing in allotted time.
3. Ability to use safety equipment and follow safety procedures during operations.
4. Ability to prepare and inspect the job for confirming desired dimensions and shape.
5. Ability to acquire hands-on experience in soldering.

Note:

1. **Note: The related theoretical contents be taught during practical**
2. The practical indicated in topic number 1 , 2 & 3 will be performed in the general workshop while practical indicated in topic number 4,5 & 6 will be conducted in the electronics laboratory.
3. Assessment will be done by workshop dept. and electronics dept. separately for 25 marks each. And average of both will be converted as per teaching scheme.
4. Mark sheet will be submitted by Electronics Department.

Sr. No.	Details of Practical Contents
1	WOOD WORKING SHOP: <ul style="list-style-type: none"> • Demonstration of different wood working tools / machines, wood working processes, like planning, marking, chiseling, grooving, turning of wood etc. • One simple job of preparing switch board or any other similar job
2.	FITTING SHOP: <ul style="list-style-type: none"> • Demonstration of different fitting tools and drilling machines and power tools , different operations like chipping, filing, drilling, tapping, cutting etc. • One simple fitting job involving practice of filing, drilling, tapping, cutting etc. Such as Regulator Heat sink, Transistor Heat Sink or any other similar job
3	SHEET METAL SHOP: <ul style="list-style-type: none"> • Demonstration of different sheet metal tools / machines., different sheet metal operations like sheet cutting, bending, edging, end curling, lancing , soldering and riveting. • One simple job involving sheet metal operations and soldering and riveting. Such as Battery Eliminator Box or any other similar job
4	IDENTIFICATION OF ELECTRONIC COMPONENTS: <ul style="list-style-type: none"> • Drawing of symbols / conventions of components, devices, electromechanical switches, relays, Displays, connectors and cables used in Electronics and Electrical engineering. • Identify electromechanical components; write down the technical specifications using datasheet / Manual. • Collect the catalog from market / internet for instruments, tools required for electronic workshop and write down the specification, cost and name of the manufacturer with the help of catalog. (Catalogs of Multimeter. Power supply , function generator, CRO).
5	ELECTRONIC SOLDERING SHOP:

	<ul style="list-style-type: none"> • Introduction and Demonstration of soldering and desoldering tools like normal soldering gun, temperature controlled soldering gun, soldering metals, soldering flux, soldering pot, Desoldering gun, desoldering pump, desoldering mesh. • Demonstration of different soldering techniques like hand soldering, wave soldering and dip soldering • One simple job involving soldering and desoldering of electronic components
6	<p>HANDS ON SKILLS</p> <ul style="list-style-type: none"> • Assembly of electrical extension board (Extension board used, which is prepared in carpentry) • Heat sink fitting to regulator (heat sink used, which is prepared in Fitting shop) • Continuity testing using Multimeter

Learning Resource:**Books:**

Sr. No	Books	Author	Publication
1.	Troubleshooting Electronic Equipment	R.S.Khandpur	Tata McGraw Hill
2.	Electronic Components Handbook	Thomas H. Jones	Reston Publishing Company

Course Name : Mechanical Engineering / Chemical Engineering

Course Code : AE/CH/FE/ME/MH/MI/PG/PT/PS

Semester : First

Subject Title : Basic Workshop Practice (Mechanical & Chemical Group)

Subject Code : 17006

Teaching & Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Rationale:

Diploma Mechanical Engineer is expected to develop basic workshop skills in wood working, Welding, sheet metal and plumbing.

Students are require to identify, select and use different kinds of tools, such as marking, measuring,, cutting, supporting, striking and various holding devices.

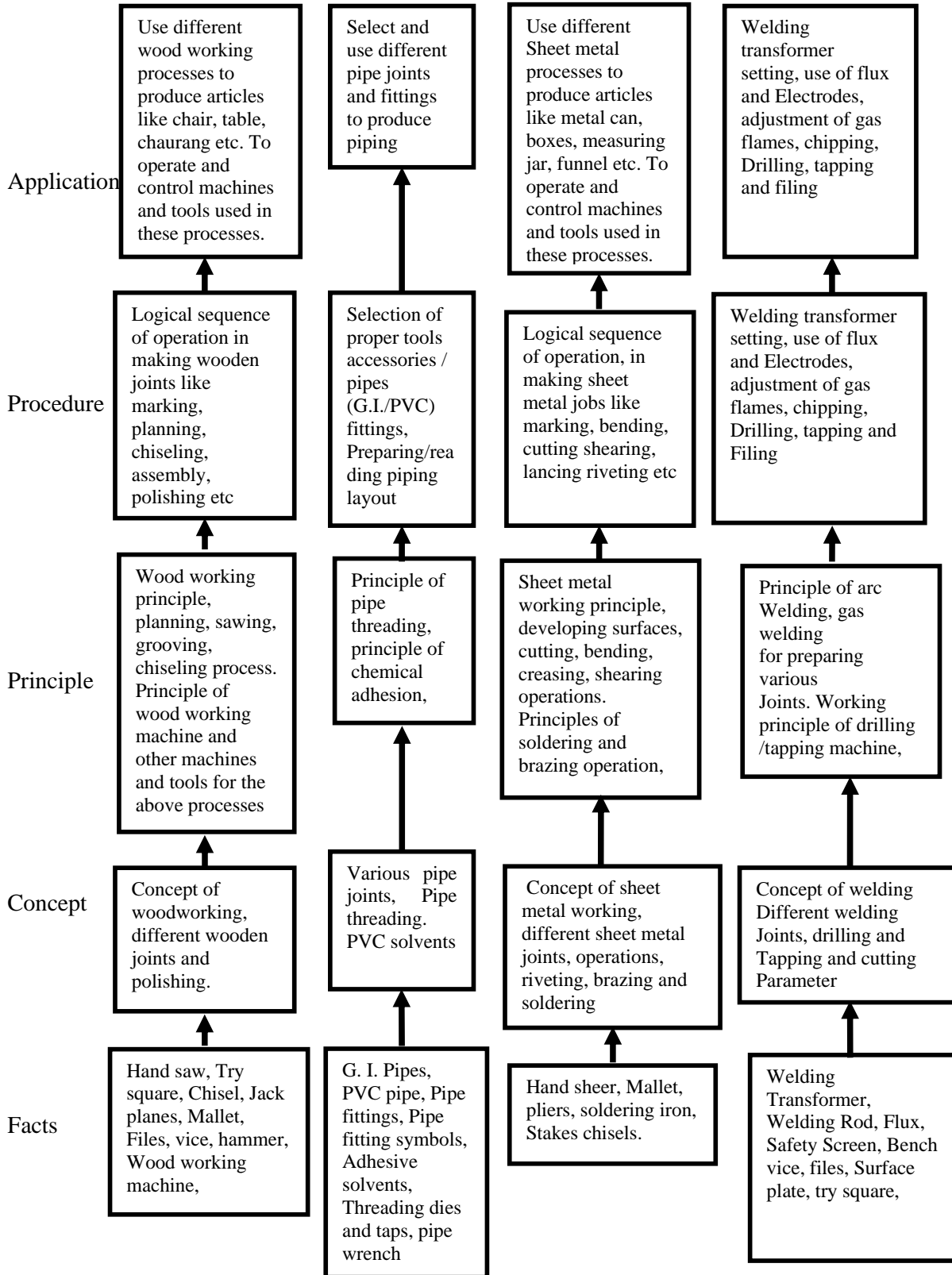
These workshop practices are commonly used in engineering industries. Knowledge of Basic Workshop Practice and Workshop Practice enables students to use in preparing composite jobs.

General Objectives:

The student will able to

- Know basic workshop processes.
- Read and interpret job drawing, plan various operations and make assembly.
- Identify and select the proper material for the job undertaken.
- Identify, select and use various marking, measuring, holding, striking and cutting tools & equipments.
- Operate, control different machines and equipment in respective shops.
- Inspect the job for specified dimensions
- Produce and inspect the jobs as per specified dimensions.
- Adopt safety practices while working on various machines.

Learning Structure:



Practical:

Note: The related theoretical contents be taught during practical

Skill to be developed:**Intellectual Skills:**

1. Ability to read and interpret job drawing and plan operations
2. Ability to identify and select proper material, tools, equipments and machines.
3. Ability to select proper operational parameters

Psychomotor Skills:

1. Ability to set tools, work piece, and machines for desired operations.
2. Ability to complete job as per job drawing in allotted time.
3. Ability to use safety equipment and follow safety procedures during operations.
4. Ability to inspect the job for confirming desired dimensions and shape.
5. Ability to acquire hands-on experience.

List of Practical:

Sr. No	Topic Objectives	Details of Practical Contents	Hrs.
01	<ul style="list-style-type: none"> ➤ To appreciate the importance of wood working in engineering works ➤ To select the proper wood material for the job undertaken ➤ To identify and use various marking , measuring, cutting, striking and inspection tools used in wood working 	<p>WOOD WORKING SHOP: Demonstration of different wood working tools and machines.</p> <p>Demonstration of different wood working processes, like planning, marking, chiseling, grooving, turning of wood etc.</p> <p>One simple job involving any one joint like mortise and tenon, dovetail, bridle, half lap etc for each students</p>	14
02	<ul style="list-style-type: none"> ➤ To appreciate the importance of Welding in engineering works ➤ To select the proper Steel material and proper welding machine for the job undertaken ➤ To identify and use various marking , measuring, cutting, striking and inspection tools used in Welding 	<p>WELDING SHOP : Demonstration of different welding tools / machines.</p> <p>Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding.</p> <p>One simple job involving butt and lap joint. For each students</p>	12
03	<ul style="list-style-type: none"> ➤ To appreciate the importance of Plumbing operations in engineering works 	<p>PLUMBING SHOP: Demonstration of different plumbing tools</p>	14

	<ul style="list-style-type: none"> ➤ To select the proper grade and type of different pipes required for the job undertaken. ➤ To identify and use various marking , measuring, cutting, striking and inspection tools used in Plumbing section 	<p>Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings.</p> <p>One job on simple pipe joint with nipple coupling for standard pipe. Pipe threading using standard die sets. (For each student)</p> <p>Demonstration of PVC pipe joint with various fittings.</p> <p>Exercise for students on preparing actual pipeline layout for G.I. Pipe or PVC pipe. Preparing actual drawing and bill of material.</p>	
<p style="text-align: center;">04</p>	<ul style="list-style-type: none"> ➤ To appreciate the importance of Sheet metal operations in engineering works ➤ To select the proper gauge and type of different G.I. sheets required for the job undertaken. ➤ To identify and use various marking , measuring, cutting, striking and inspection tools used in Sheet Metal section section 	<p>SHEET METAL SHOP: Demonstration of different sheet metal tools / machines.</p> <p>Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering and riveting.</p> <p>One simple job involving sheet metal operations and soldering and riveting. For each student.</p> <p>One composite job from the following: Letter box, Trunk, Grain Container, Water-heater Container, Bucket, Waste Paper Basket, Cooler Tray, Water-draining Channel, etc. (including soldering and riveting)</p> <p>[Batch size should be selected depending on volume of work. Job allotted should comprise of 4-6 hours of actual working ions.</p> <p>Student shall calculate the cost of material and labor cost required for their job from the drawing. }</p>	<p style="text-align: center;">16</p>

Assignments: ----- 8 hours

A journal shall consist of one assignment each on the topics 1 to 4 mentioned above.

Each assignment shall consist of –

- Procedural steps in completing a given job
- Description and drawings of different tools used
- List of safety equipments used and safety rules observed during working

Notes:

- 1] The subject teacher should provide necessary theory inputs to students of all shops before their actual practical.
- 2] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.
- 3] The workshop diary shall be maintained by each student duly signed by instructor of respective shop
- 4] Workshop Tool Manual at institute level shall be provided to the students
- 5] Out of 50 marks allotted for term work, 40 marks are for actual jobs completed and 10 marks for assignment.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher / Edition
01	S.K. Hajara Chaudhary	Workshop Technology	Media Promoters and Publishers, New Delhi
02	B.S. Raghuwanshi	Workshop Technology	Dhanpat Rai and sons, New Delhi
03	H.S.Bawa	Workshop Practice	Tata McGraw Hill Publishers, New Delhi
04	Kent's	Mechanical Engineering Hand book-	John Wiley and Sons, New York
05	P. Kannaiah and K. L. Narayana	Workshop Manual	SCITECH Publications
06	Electronics Trade & technology Development Corporation.(A Govt. of India undertaking) Akbar Hotel Annex, Chanakyapuri, New Delhi- 110 021		

CDs, PPTs Etc.:

- Learning Materials Transparencies and CDs, CBT Packages developed by N.I.T.T.E.R. and other organizations
- Refer website www.npkauto.com for Workshop Tool Manual
- Workshop Manual by P. Kannaiah and K. L. Narayana , SCITECH Publications

Course Name : Computer Engineering Group

Course Code : CD/CM/CO/CW/IF

Semester : First

Subject Title : Basic Workshop Practice (Computer)

Subject Code : 17007

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Rationale:

This subject is essential for creating awareness of computers for the students. It gives hands on experience of computer operation to the students. It introduces basic components of computers and method and means to connect them to the system.

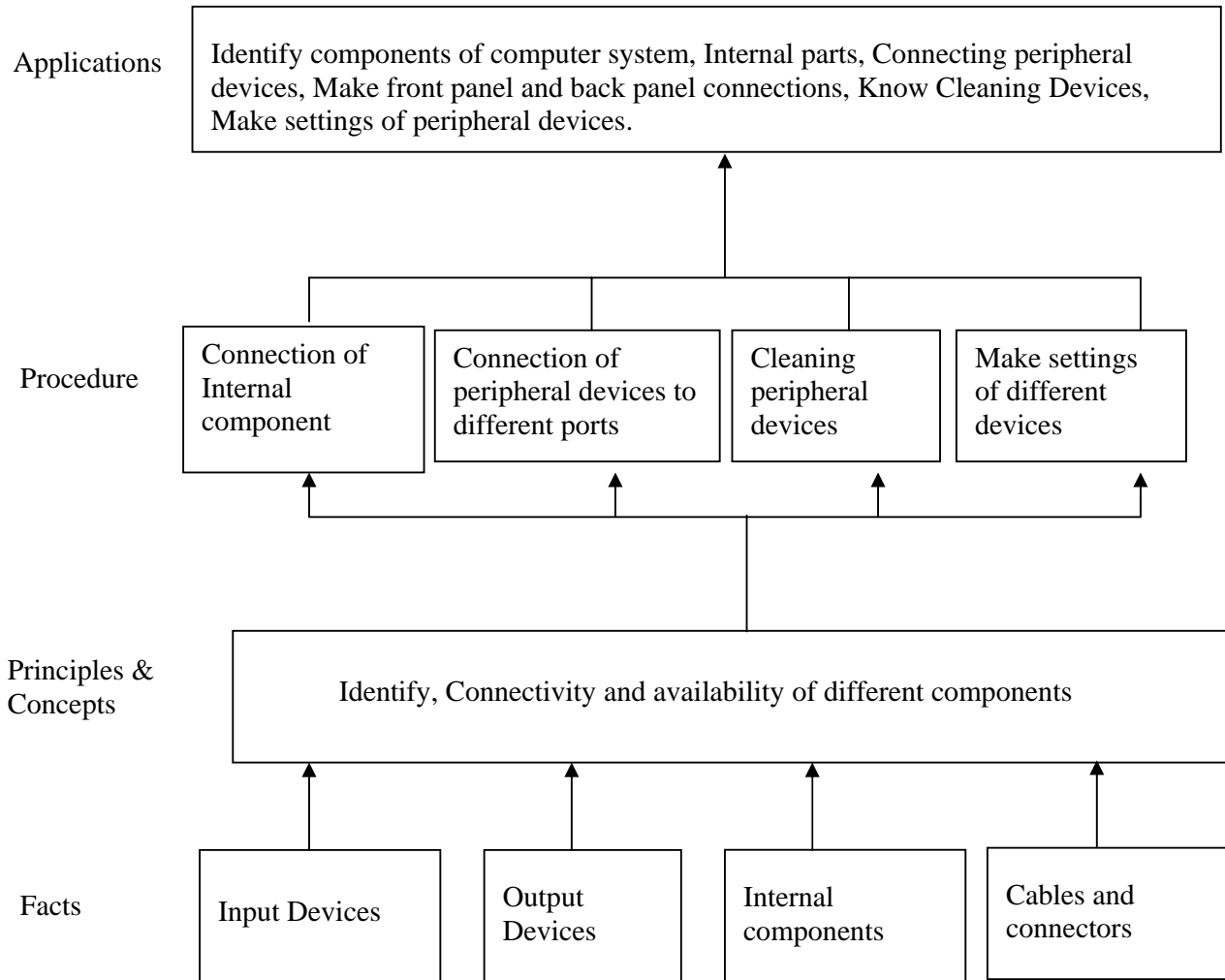
Since the dirt can affect reliability and performance of various components, cleaning of components become one of the essential activity of basic maintenance. This subject demonstrates steps in cleaning and handling various components, handling problems with component connections. This subject gives the basic knowledge required for PC architecture and maintenance.

General Objectives:

The student will be able to:

- Understand basic components of computers.
- Connect peripheral devices.
- Clean various devices like Keyboard, mouse, printers, motherboard.
- Park and eject the papers over the printer.
- Write Data on the CD.
- Scan documents and images.
- Understand front panel and back panel connections.
- Connection of Pen drives and DVD's

Learning Structure



Related Theoretical Contents

Note: The related theoretical contents be taught during practical

Topic/Subtopic
<p>1. Introduction to Various External Peripheral Devices</p> <ul style="list-style-type: none"> • Different types of keyboards • Different types of Mouse • Different types of Scanners • Different types of Modems • Different types of printers • CD writers, speakers, CD read /write drive • Microphones, LCD projectors, Pen drives, DVD drive • Different types of Monitors
<p>2. Introduction to Various Internal Devices</p> <ul style="list-style-type: none"> • Different makes of hard disks • Different types of network Interface cards • Different types of cables such as data cables, printer cables, network cables, power cables etc. • Different types of floppy disk • Motherboard connection • Graphics Card connection • Network Interface card connection
<p>3. Physical Connections of different peripheral Devices</p> <ul style="list-style-type: none"> • Connection of Mouse to different ports • Connection of keyboards to different ports • Connection of Monitors • Connection of Printers • Different switch settings of printers • Printer's self test • Jumper settings of hard disks • Attaching FDD,HDD and CD drives • Attaching Pen Drives and DVDs • Attaching Scanners

Assignments:

1. Observe all the peripheral devices available in the lab. Describe them in detail.
2. Demonstration of system configuration using CMOS setup.
3. Study of different ports such as serial, parallel, PS/2, RJ 45, USB ports.
4. How to write data on CD, DVD
5. Observe different printer settings on different types of printers available in your lab.
Write down the function of each switch.
6. Demonstration of printer's self test.

7. Connection of speakers and microphones.
8. Observe and describe different types of cables in your lab.
9. Cleaning procedures of Mouse, Keyboard and Motherboard.
10. How to connect scanner, scan documents and pictures on the scanner available in your lab. Sample printout be attached
11. Making jumper settings on hard disk.
12. Different types of cards such as graphics card, LAN card, multimedia cards etc.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	Mr. David Stone & Alfred Poor	Troubleshooting Your PC	Prentice Hall India
02	David Groth	A+ Complete	BPB Publication
03	Balasubramaniam	Computer Installation and Servicing	Tata McGraw Hill
04	Manuals	Reference Manuals of PC troubleshooting and maintenance	--